

Application No. 10/723,619
Response to Office Action

Customer No. 01933

Listing of Claims:

1. (Currently Amended) An inkjet recording head for
ejecting ink, comprising:

a plurality of sidewalls, which comprise a piezoelectric
material, and which to form a plurality of ink channels separated
5 by the plurality of sidewalls; ~~the plurality of sidewalls
comprising at least partially a piezoelectric material,~~

a bottom plate, which comprises a piezoelectric material,
and which forms to form a bottom face of the plurality of ink
channels; ~~the bottom plate comprising a piezoelectric material,~~
10 and

a plurality of electrodes formed on the plurality of side
walls, ~~for being applied to which~~ an electric voltage is
applied to cause a pressure change in the plurality of ink
channels by shear deformation of the plurality of sidewalls, and
15 so as to eject the ink in the plurality of ink channels;

wherein all of the plurality of ink channels are divided
into at least two or more groups of ink channels, ~~where a~~ and
each said group of ink channels ~~is composed of~~ comprises ink
channels ~~between which~~ having at least one of the plurality of
20 ink channels ~~is not in the group~~ sandwiched therebetween; and

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wherein an ink ejection operation is performed successively in a time-sharing mode for each of the ~~group~~ groups of ink channels, while satisfying ~~the condition~~ conditions: of

$$|CTC + CTE| \leq 10 (\%) \text{ and } |CTE| \geq 5 (\%), \text{ } [[:]]$$

25 where CTC is a crosstalk between ink channels in one group of ink channels due to a compliance ratio of the plurality of sidewalls to the ink in the plurality of ink channels, ~~channel~~ ~~is CTE~~, and CTE is a crosstalk between ink channels in one group of ink channels due to a leak of an electric field caused by the
30 electric voltage applied to the plurality of electrodes is CTE, and wherein CTC and CTE have a canceling effect on each other.

2. (Currently Amended) The inkjet recording head of claim 1, wherein each of the plurality of sidewalls comprises two layers of piezoelectric material laminated via a contact face, and each of the two layers being is polarized differently
5 ~~different with each other in the~~ in a direction perpendicular to the contact face.

3. (Currently Amended) The inkjet recording head of claim 1, wherein the plurality of electrodes ~~are present in a~~ range have a height of at least a/2 high extending from the bottom face of the plurality of ink channels, where a is an ink flow path width of each of the plurality of ink channels ~~is a~~.

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4. (Currently Amended) The inkjet recording head of claim 1, wherein the plurality of the electrodes are formed by ~~means of~~ a plating method.

5. (Currently Amended) The inkjet recording head of claim 1, wherein each of the plurality of ink channels has an ink flow path width of not greater than 100 μm , and an ink channel depth of not greater than 300 μm .

6. (Currently Amended) The inkjet recording head of claim 1, wherein the plurality of ink channels are formed ~~of~~ by:

a substrate, on which a plurality of grooves are formed ~~7~~
~~the grooves being that are~~ separated by the plurality of
5 ~~sidewalls; comprising at least partially a piezoelectric~~
~~material; and~~

a cover plate adhered to ~~the top face~~ faces of the plurality of sidewalls;

wherein ~~the~~ a thickness of the piezoelectric material at the
10 bottom face of each of the plurality of ink channels is at
least 10 μm .

7. (Currently Amended) The inkjet recording head of claim 5, wherein the plurality of ink channels are formed ~~of~~ by:

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a substrate, on which a plurality of grooves are formed ~~7~~
~~the grooves being that are~~ separated by the plurality of
5 ~~sidewalls; comprising at least partially a piezoelectric~~
~~material; and~~

a cover plate adhered to ~~the top face~~ faces of the plurality
of sidewalls;

wherein ~~the~~ a thickness of the piezoelectric material at the
10 bottom face of each of the plurality of ink channels is at
least 10 μm .

8. (Currently Amended) The inkjet recording head of
claim 1, wherein ~~the~~ a density of the plurality of ink channels
is at least 150 dpi.

9. (Currently Amended) The inkjet recording head of
claim 7, wherein ~~the~~ a density of the plurality of ink channels
is at least 150 dpi.

10. (Currently Amended) The inkjet recording head of
claim 1, wherein ~~the~~ a density of the plurality of ink channels
is at least 300 dpi.

11. (Currently Amended) The inkjet recording head of
claim 7, wherein ~~the~~ a density of the plurality of ink channels
is at least 300 dpi.

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12. (Currently Amended) ~~The~~ An inkjet recording head of ~~claim 1, for ejecting ink, comprising:~~

a plurality of sidewalls, which comprise a piezoelectric material, and which form a plurality of ink channels separated by
5 the plurality of sidewalls;

a bottom plate, which comprises a piezoelectric material, and which forms a bottom face of the plurality of ink channels; and

10 a plurality of electrodes formed on the plurality of side walls, to which an electric voltage is applied to cause a pressure change in the plurality of ink channels by shear deformation of the plurality of sidewalls, so as to eject the ink in the plurality of ink channels;

15 wherein all of the plurality of ink channels are divided into at least two groups of ink channels, and each said group of ink channels comprises ink channels having at least one of the plurality of ink channels not in the group sandwiched therebetween;

20 wherein an ink ejection operation is performed successively in a time-sharing mode for each of the groups of ink channels, while satisfying a condition:

$$|CTC + CTE| \leq 10 (\%) \text{ and } |CTE| \geq 5 (\%).$$

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25 where CTC is a crosstalk between ink channels in one
 group of ink channels due to a compliance ratio of the plurality
 of sidewalls to the ink in the plurality of ink channels, and CTE
 is a crosstalk between ink channels in one group of ink channels
 due to a leak of an electric field caused by the electric voltage
 applied to the plurality of electrodes is CTE; and

30 wherein ~~the~~ a product of a density of the plurality of ink
 channels (dpi) and ~~the~~ a depth of said plurality of ink channels
 (μm) ~~satisfies the following relation: the density (dpi) x the~~
 ~~depth (μm)~~ is less than or equal to 5.5×10^4 .

Claims 13-16 (Canceled).

17. (Currently Amended) The inkjet recording head of
claim 1, wherein all of the plurality of ink channels are divided
into three of said groups of ink channels, ~~where a group of ink~~
~~channels is composed of ink channels between which two of the~~
~~plurality of ink channels is sandwiched.~~

18. (Currently Amended) The inkjet recording head of
claim 12, wherein all of the plurality of ink channels are
divided into three of said groups of ink channels, ~~where a~~
~~group of ink channels is composed of ink channels between which~~
~~two of the plurality of ink channels is sandwiched.~~

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19. (New) The inkjet recording head of claim 12, wherein each of the plurality of ink channels has an ink flow path width of not greater than 100 μm , and an ink channel depth of not greater than 300 μm .

20. (New) The inkjet recording head of claim 12, wherein the plurality of ink channels are formed by:

a substrate, on which a plurality of grooves are formed that are separated by the plurality of sidewalls; and

5 a cover plate adhered to top faces of the plurality of sidewalls;

wherein a thickness of the piezoelectric material at the bottom face of each of the plurality of ink channels is at least 10 μm .